THE DYNAMIC INFORMATION ARCHITECTURE SYSTEM: AN ADVANCED SIMULATION FRAMEWORK FOR MILITARY AND CIVILIAN APPLICATIONS

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BRIEFING OUTLINE

> Introduction to DIAS
  - Historical Overview
  - Key Features
  - GeoViewer

- DIAS Instantiations

- Summary

HISTORICAL OVERVIEW: DIAS SPONSORSHIP

Dynamic Environmental Effects Model (DEEM)

- JWARS — Joint Warfare System
- USA Forces Command
- South Florida Water Management District & USAE Corps of Engineers
- DMSO — Defense Modeling Simulation Office
- USAF Air Weather Service
- The Joint Staff/J-8 & DOE

Distributed Intelligent Agents for Logistics (DIAL)

- USA Logistics Integration Agency

KARE*PLAN

- Kaiser Permanente

HISTORICAL OVERVIEW: PURPOSE AND DESIGN GOALS

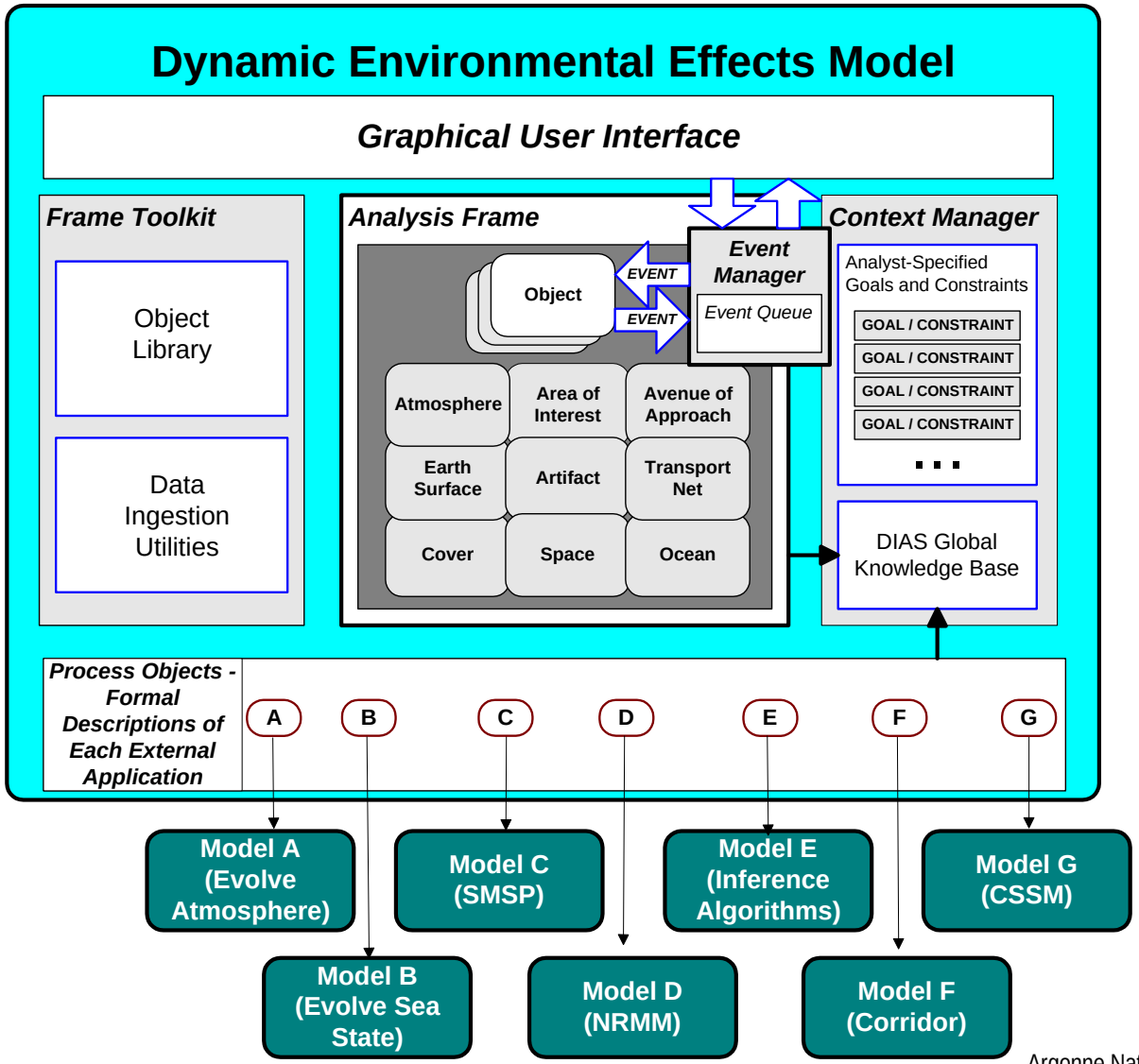
- DIAS Is a Simulation Framework Within Which New or "Legacy" Software Applications (Models, Databases, etc.) Can be Integrated to Operate in a Context-Driven Frame of Reference.

- DIAS:
  - Provides a Flexible and Extensible Mechanism to Allow Disparate (and Mixed Language) Software Applications to Interoperate.
  - Captures the Dynamic Interplay Between Different Processes or Phenomena in the Same Frame of Reference.
  - Accommodates a Broad Range of Analysis Contexts, With Widely Varying Spatial and Temporal Resolutions and Fidelity.

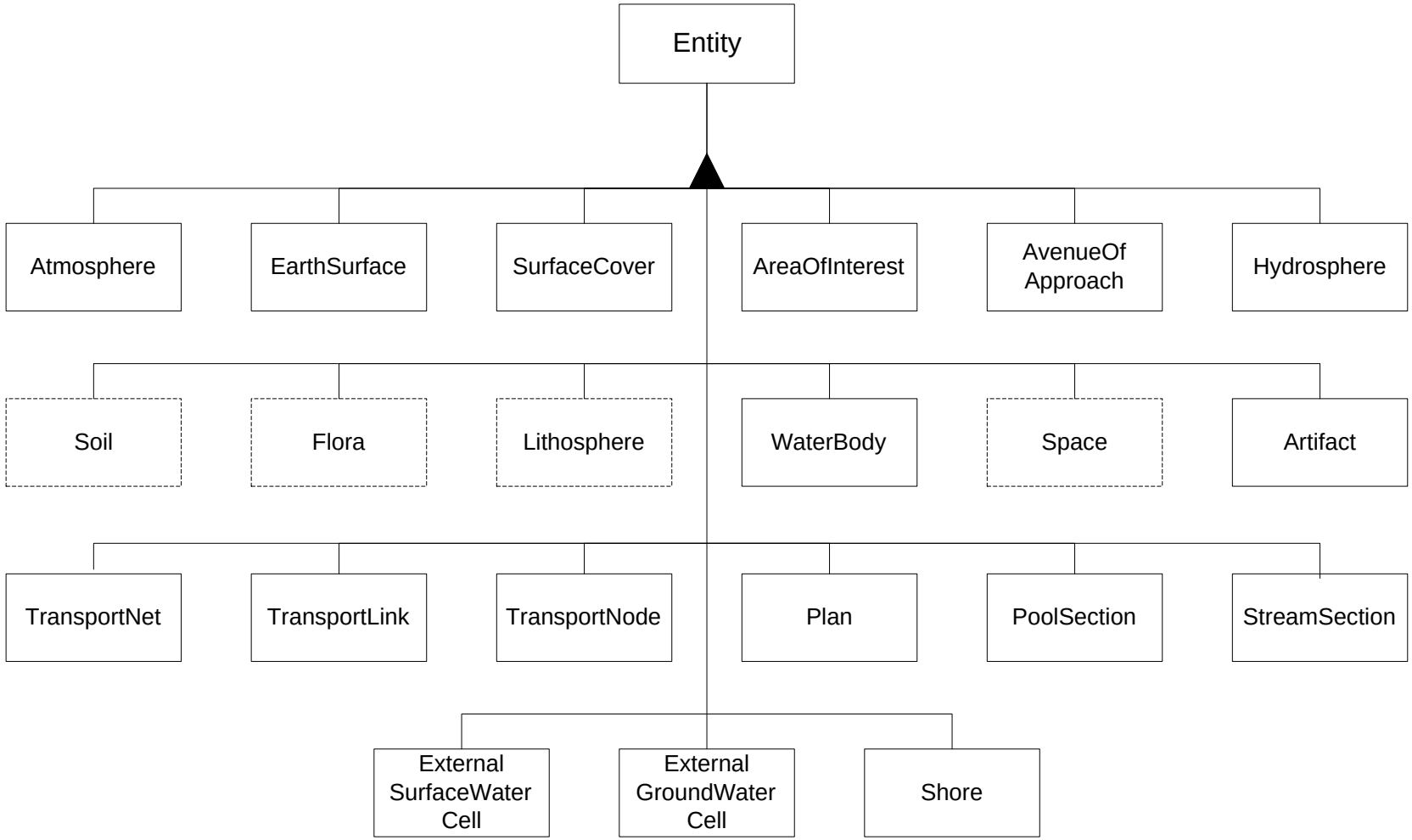
DIAS KEY FEATURES: COMPUTATIONAL ENVIRONMENT

- Fully Object-Oriented and Based on the Object Paradigm.
- Presently Hosted on UNIX Workstations. DIAS is Developed in a Mixed Language Environment
  - Basic Architecture in Smalltalk Supported With C and C++ Where Appropriate
  - Models/Applications Are Integrated in Whatever Language They Were Developed in (C, C++, FORTRAN, Modsim II, …)
- Can Support a True Object Data Base Management System to Provide Persistence to DIAS Objects. Gemstone Currently Being Used

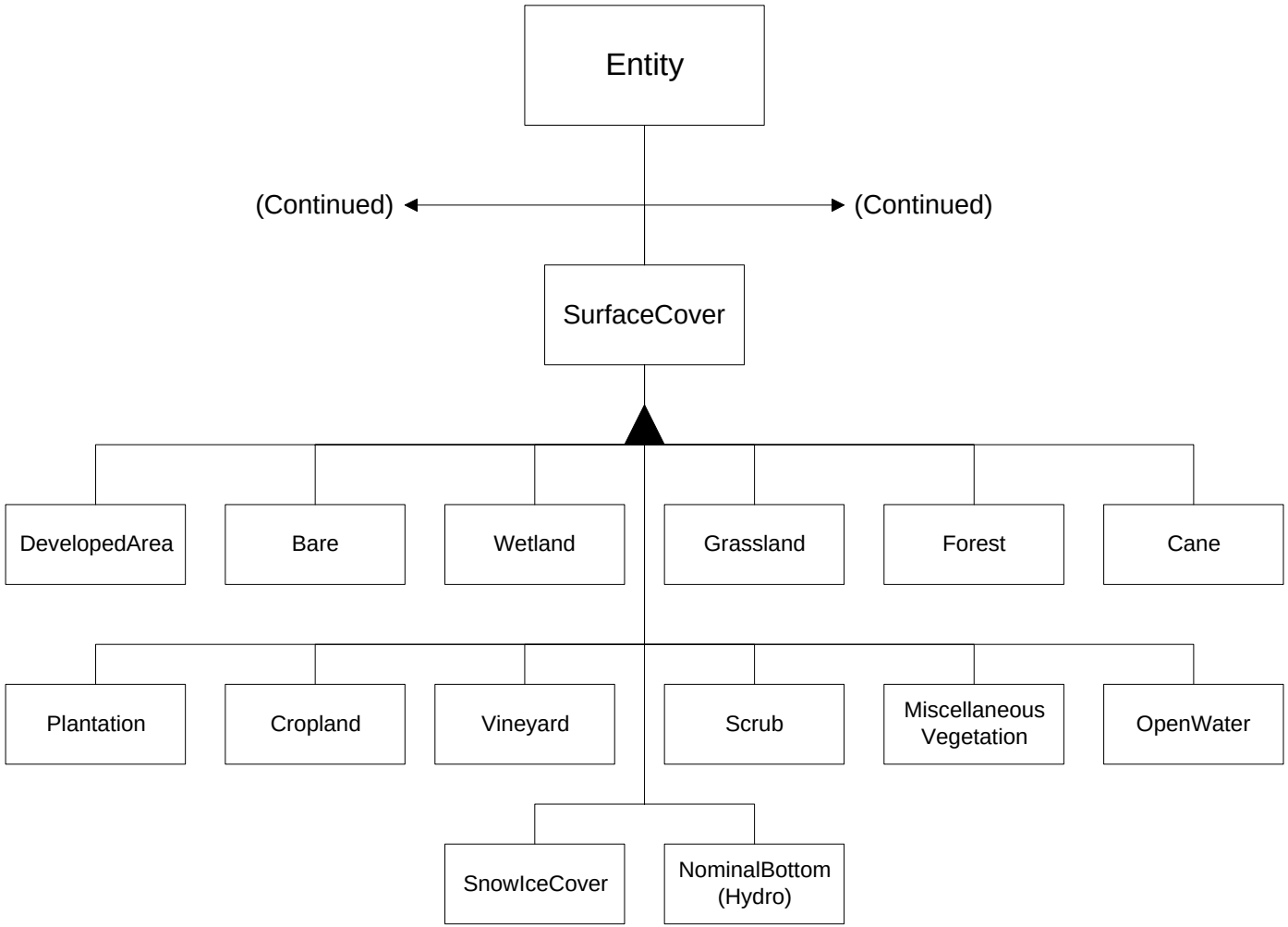
DIAS KEY FEATURES: REPRESENTATION OF THE ARCHITECTURE



DIAS KEY FEATURES: EXAMPLES OF DOMAIN OBJECTS



DIAS KEY FEATURES: EXAMPLES OF DOMAIN OBJECTS (Cont.)



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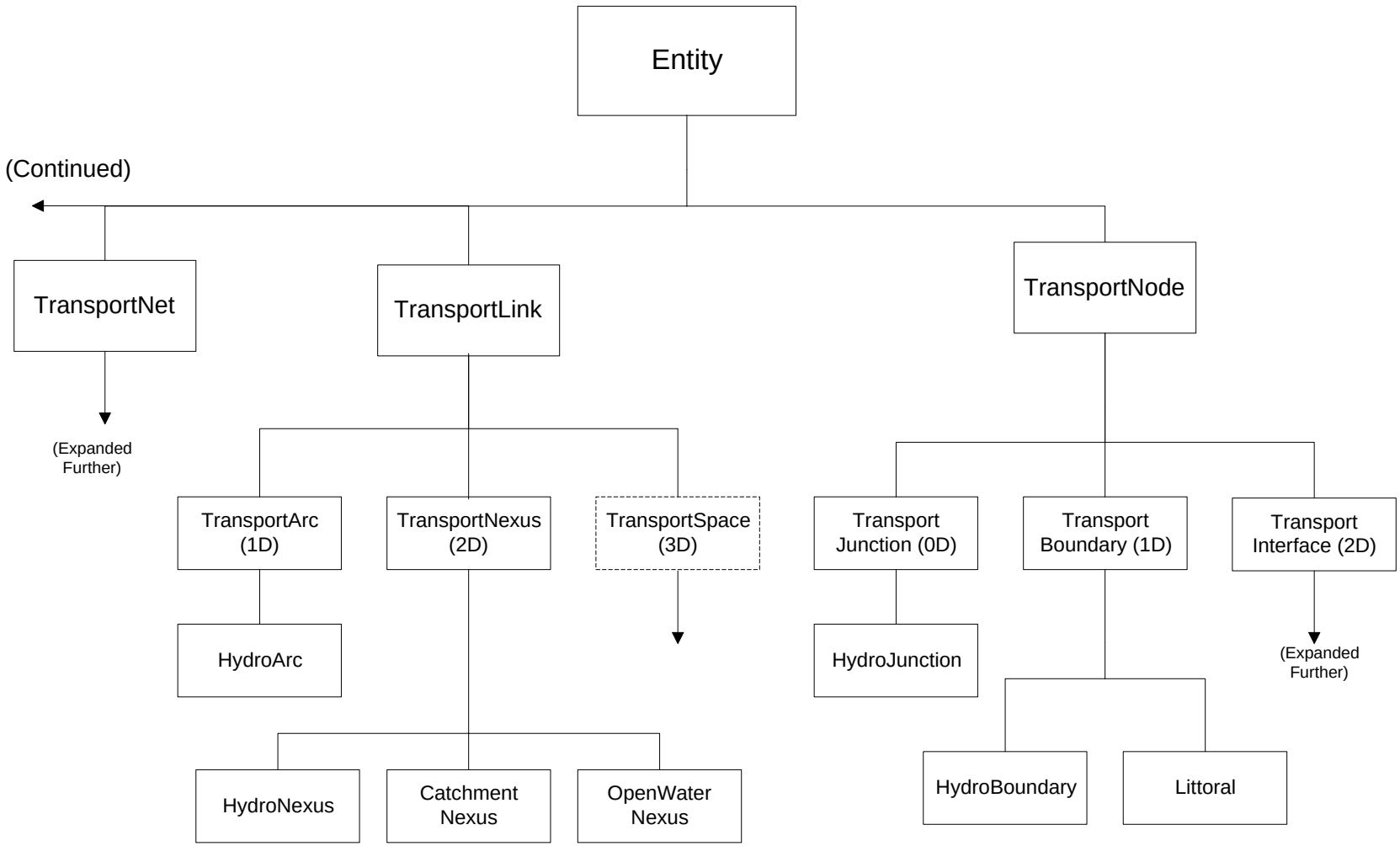
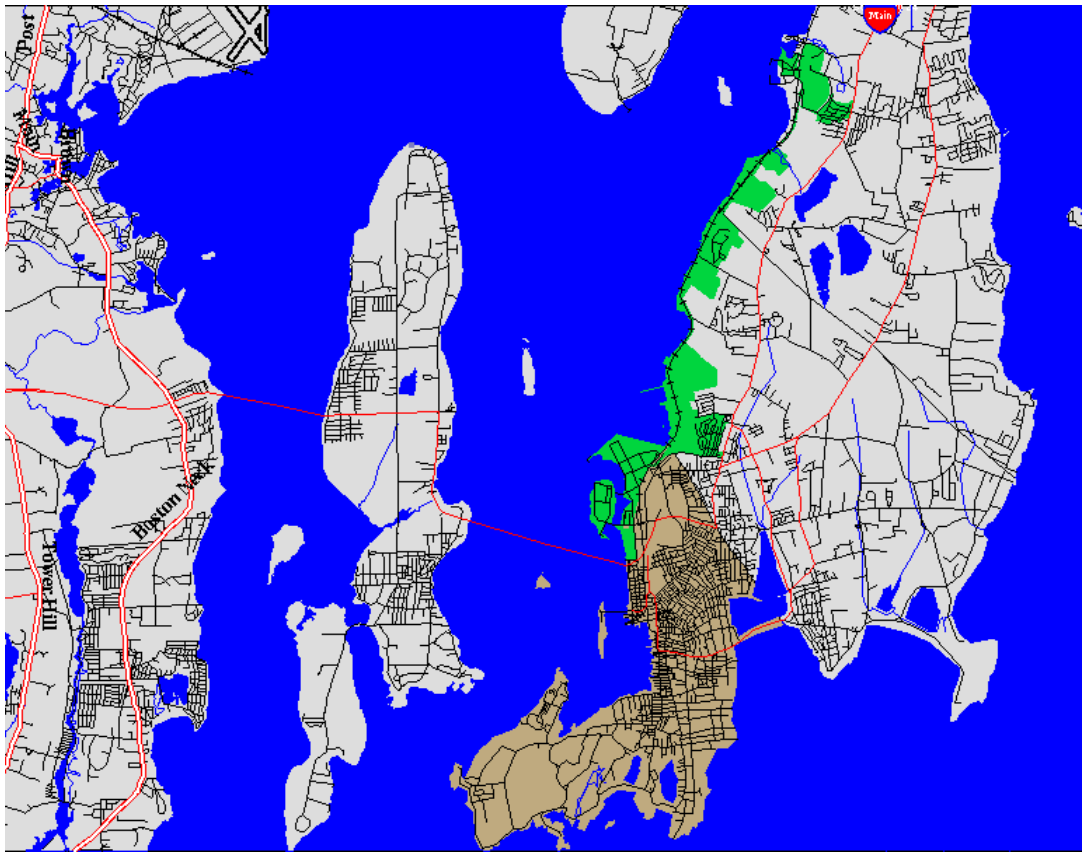


THE GEOVIEWER: AN ADVANCED SPATIAL DISPLAY TOOL

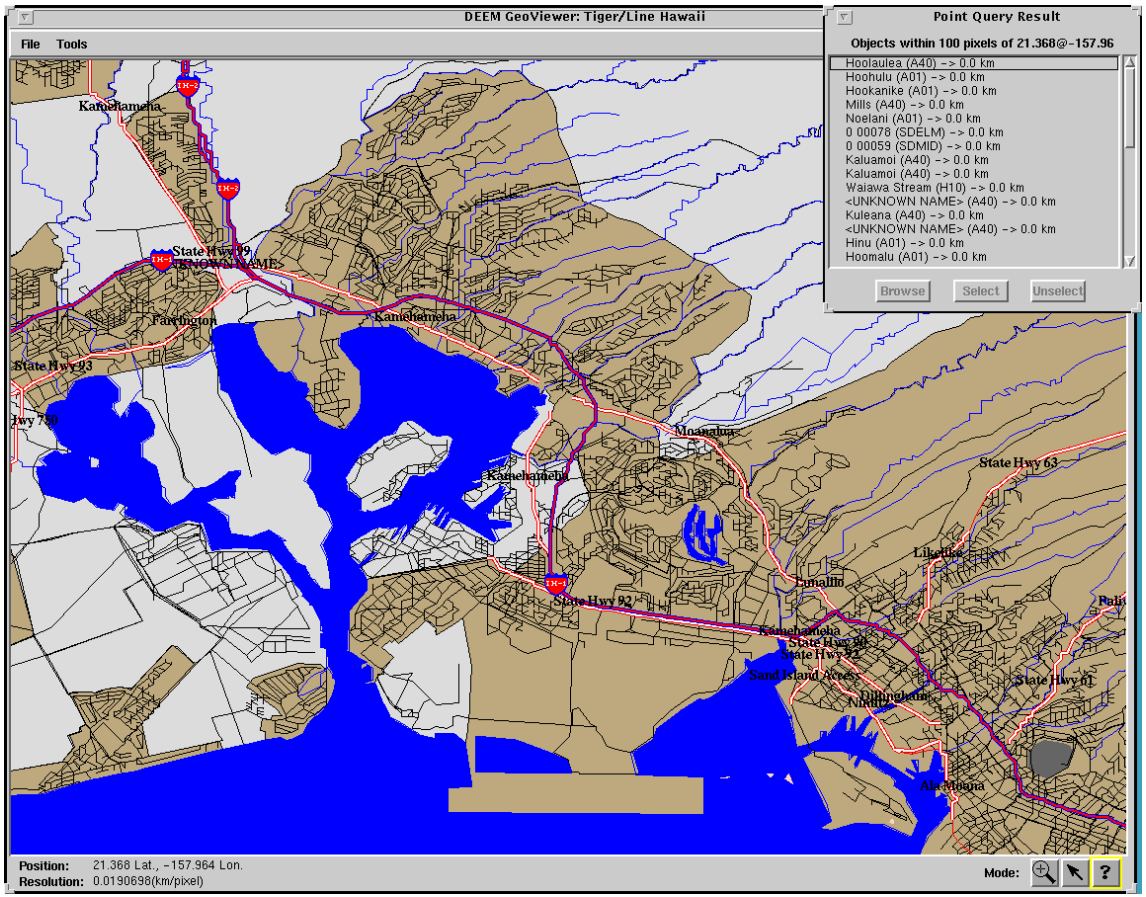
- DIAS Includes an Object-Based Geographic Information System (GIS) Component - the GeoViewer - That Can be Used to Display *Any* Spatial Data.
- Includes Full Dynamic Coupling With the Underlying Functionality in the Simulation
- Includes Full GIS Functionality: Layer Management, Extended Relational Queries, etc.
- All Entity Attributes Can Be Queried and Inspected.

GEOVIEWER (Cont.)



- The GeoViewer Can Use Data From Common Data Sources, NIMA, USGS, Tiger, ...
- Example: Newport Rhode, Island Using TIGER data

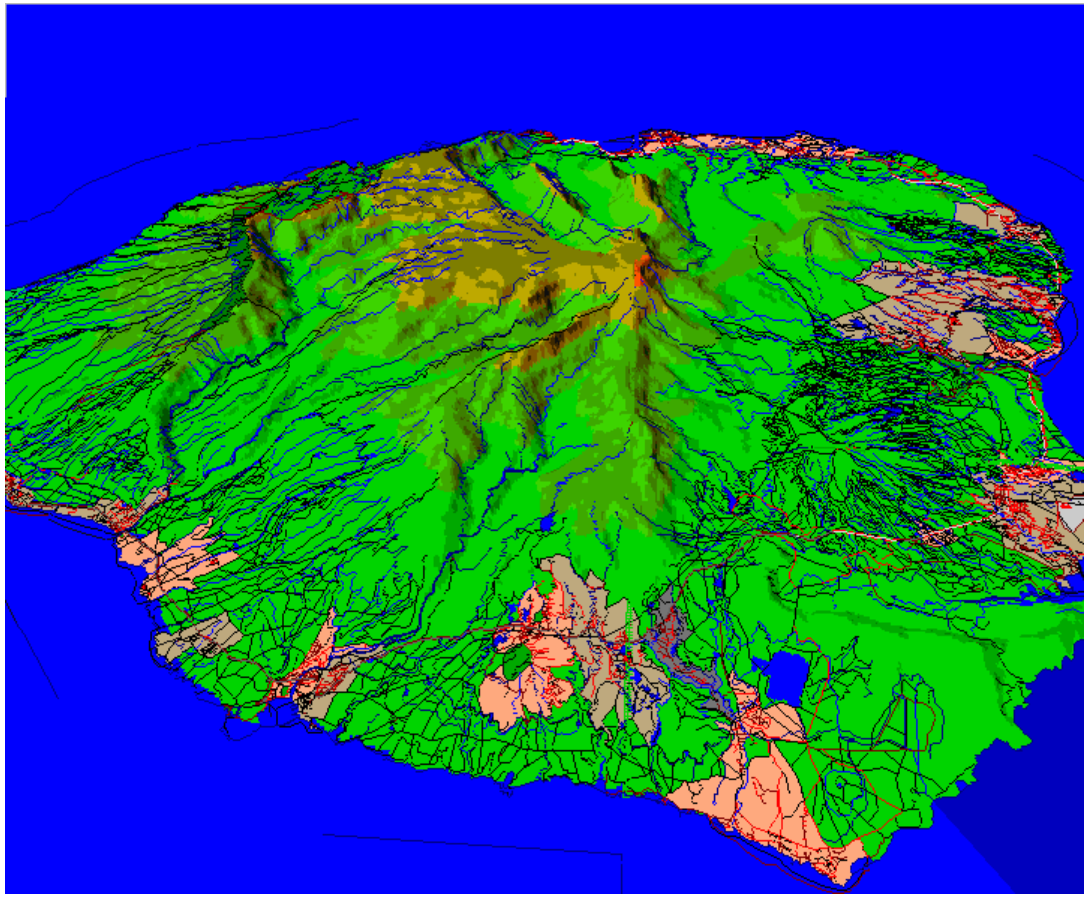
GEOVIEWER (Cont.)



Example of Querying Tools

- An Object Query Listing All Objects Within 100 Pixels of a Given Point (X)
- Objects Displayed within Layer Hierarchy
- Legend Information Included in Query Result

GEOVIEWER (Cont.)



Results Can Be Displayed in 2 or 3 D From Different Perspectives

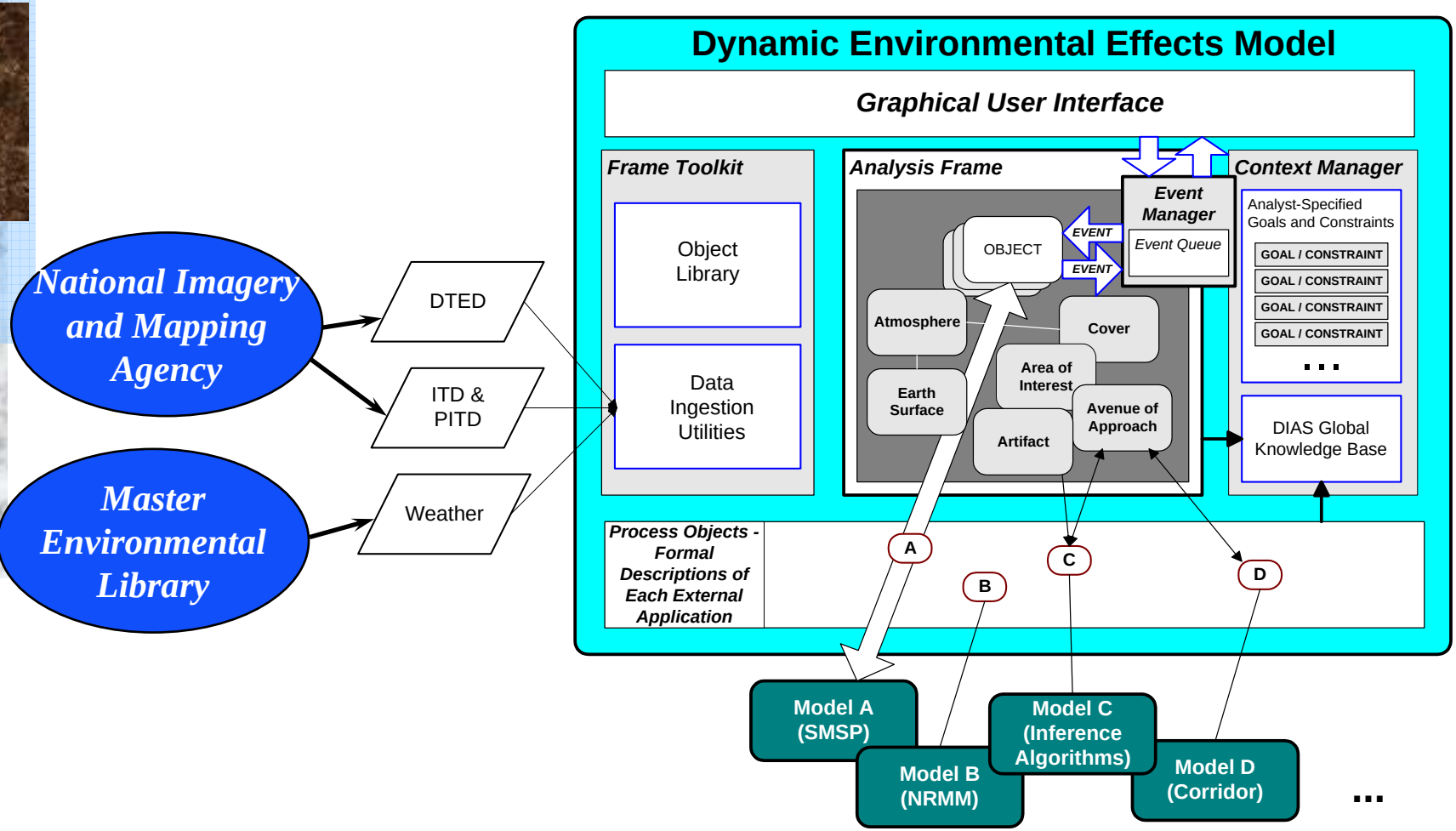
BRIEFING OUTLINE

- Overview of DIAS

> DIAS Instantiations
  - DEEM: Dynamic Environmental Effects Model
  - DIAL: Distributed Intelligent Agent for Logistics
  - KARE*PLAN: Health Care Simulation

- Summary

DYNAMIC ENVIRONMENTAL EFFECTS MODEL



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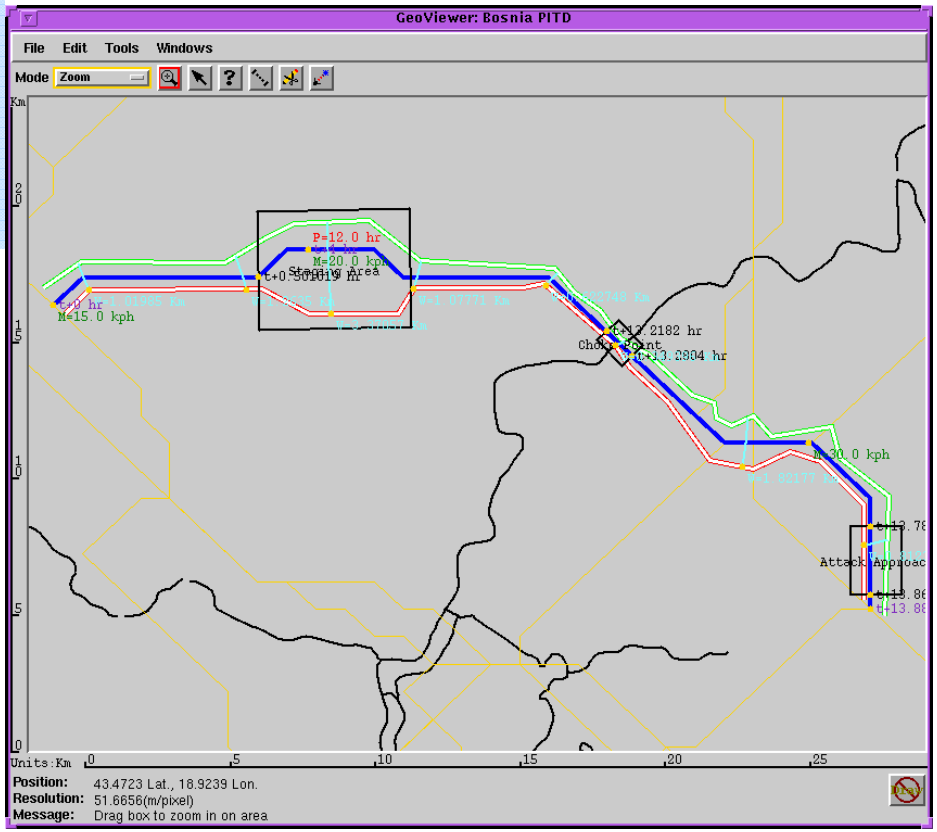
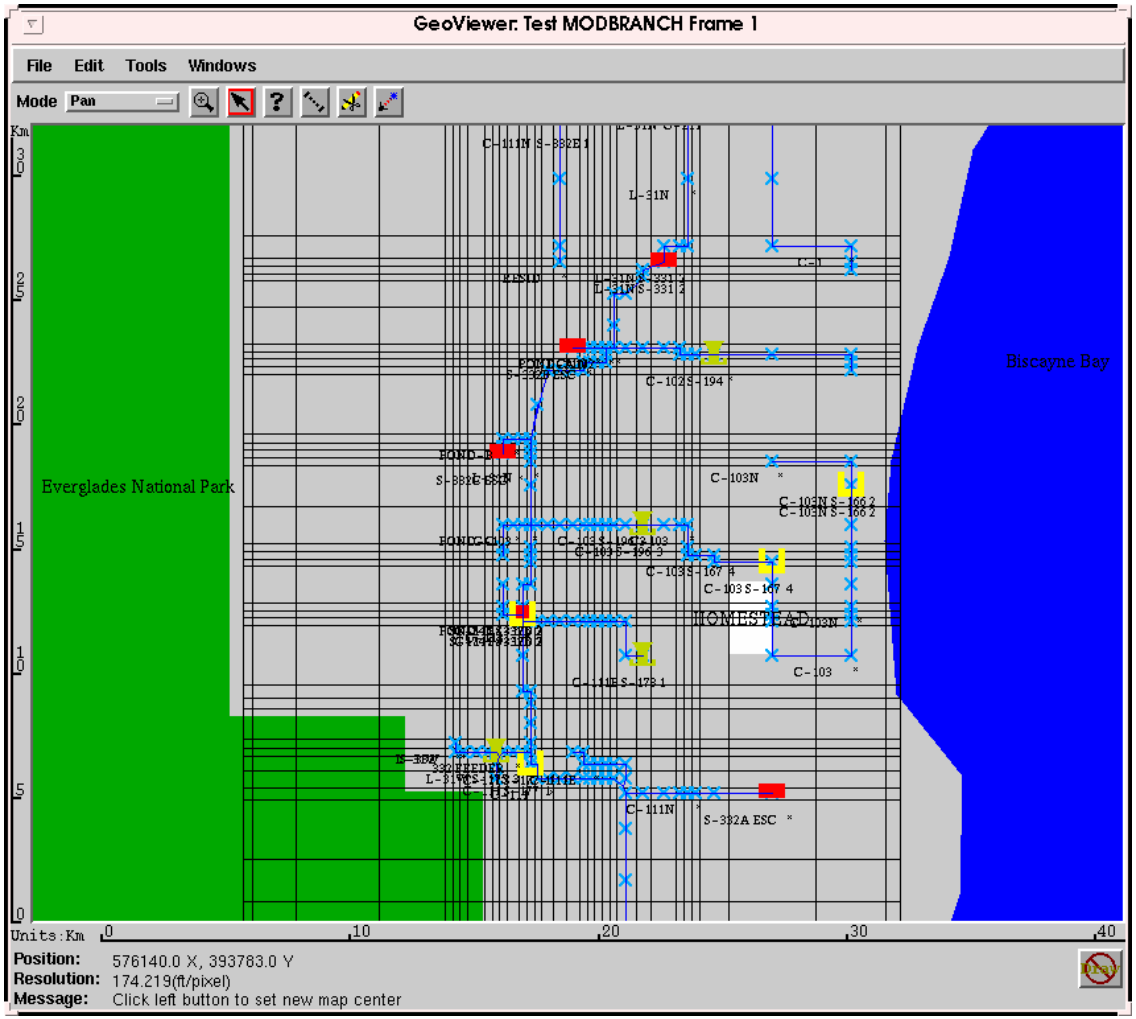


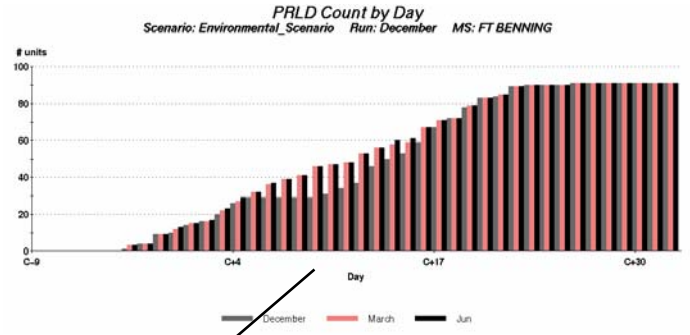
- Functionality Provided Includes Environmentally Dependent:
  - Vehicle Mobility
  - Divisional Mobility Corridors
  - Avenues of Approach and Named Areas of Interest
  - Line-of-Sight With Cloud Obscuration and Terrain Masking

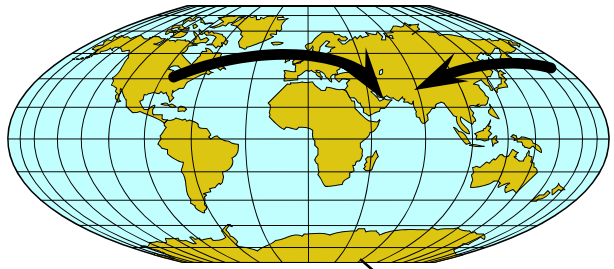
DYNAMIC ENVIRONMENTAL EFFECTS MODEL

Advanced Hydrological Modeling

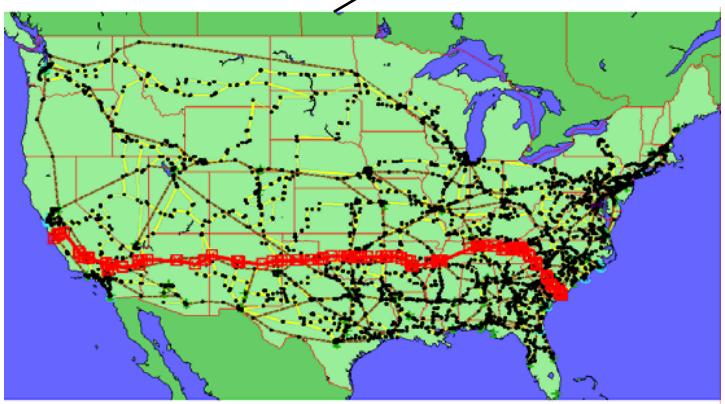


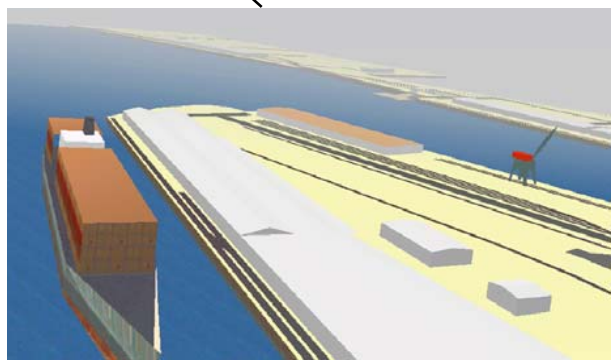
DISTRIBUTED INTELLIGENT AGENT FOR LOGISTICS





FORCEGEN-MOBSAM → AM → CONUS-ELIST → AM → PORTSIM → AM → MIDAS





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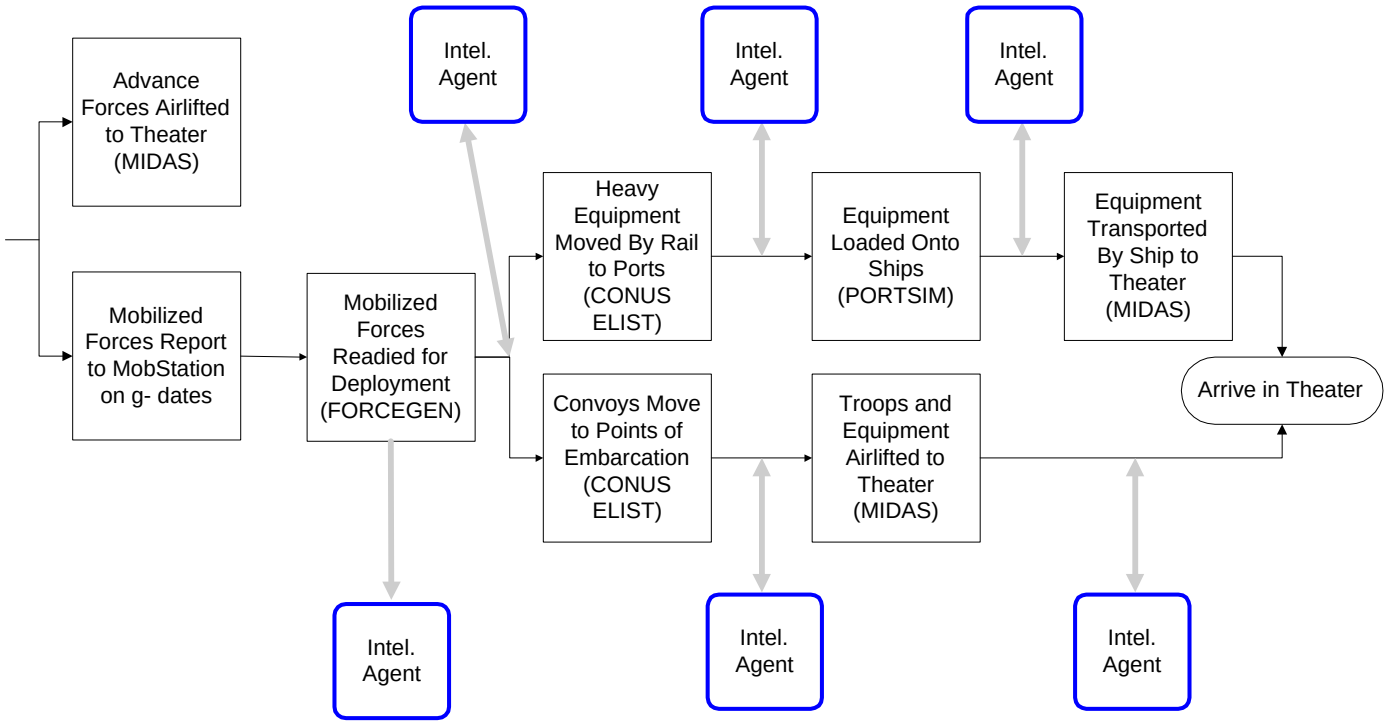

- With User-Supplied Rules, Agents Would Monitor Model Outputs and Identify "Significant" Differences Between the TPFDD and Predicted Time-Phased Data (*e.g.* PRLD, Equipment Arrival Dates, …)
- Agents Would Recommend Alternate TPFDDs and/or Movement Strategies
- User Would be Notified if Agent Could Not Resolve Imbalances

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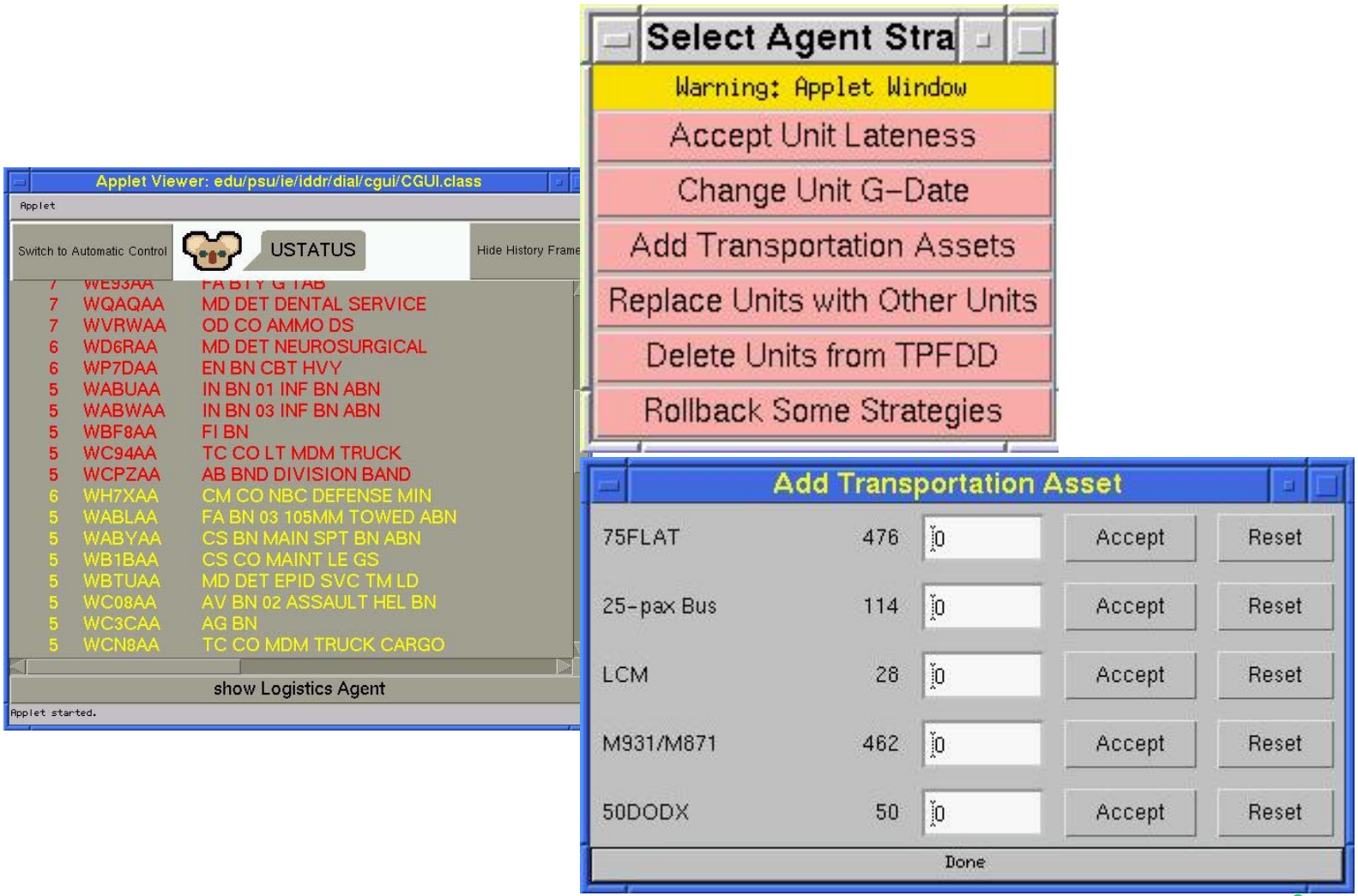
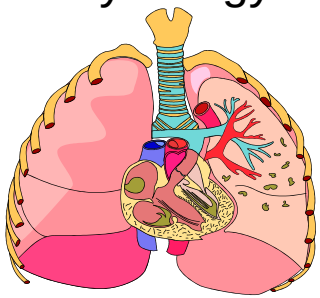
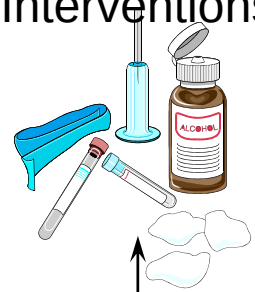


KARE*PLAN

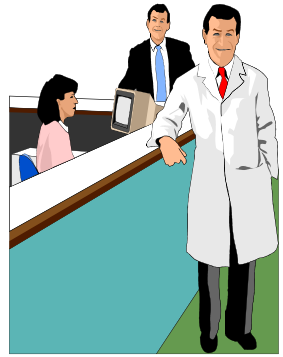
80 Diseases and Physiology



Treatments and Interventions



Physicians and Staff



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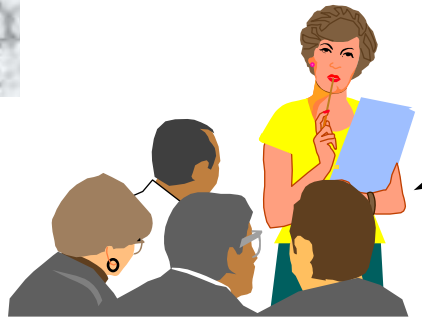
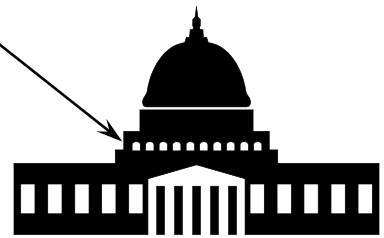


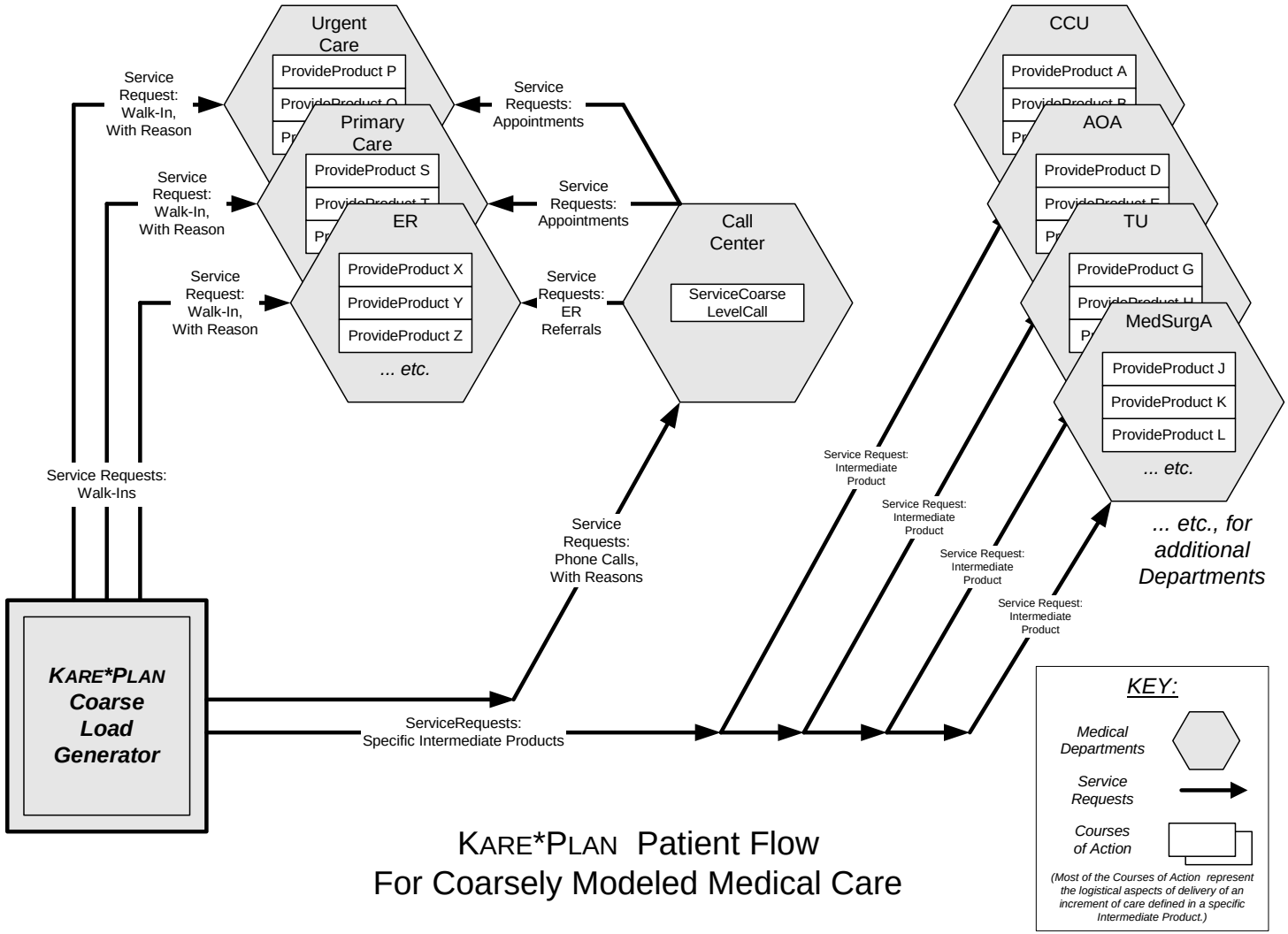
Demographically Correct Membership and Member Satisfaction

Economic Considerations



Policy Considerations

KARE*PLAN



KARE*PLAN Patient Flow
For Coarsely Modeled Medical Care

SUMMARY

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- For More Information:
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  - John R. Hummel: hummel@athens.dis.anl.gov
  - DIAS Homepage: http:\\www.dis.anl.gov\DIAS\